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BIOGRAPHY.

PROF. E. B. SEITZ, M. L. M. S.

BY B. F. FINKEL.

Professor Enoch Beery Seitz, the most distinguished mathematician of his day, was born in Fairfield county, Ohio, August 24, 1846, and died at Kirksville, Missouri, October 8, 1883. His father, Daniel Seitz, was born in Rockingham county, Virginia, December 17, 1791, and was twice married. His first wife's maiden name was Elizabeth Hite, of Fairfield county, Ohio, by whom he had eleven children. His second wife's maiden name was Catherine Beery, born in the same county, April 11, 1808, whom he married April 15, 1832, and by whom he was blessed with four sons and three daughters. He died near Lancaster, Ohio, October 14, 1864, in his seventy-third year, having been a resident of Fairfield county for sixty-three years.

Prof. Seitz, the third son by his father's second marriage, passed his boyhood on a farm, and like most men that have become noted, had only the advantages of a common school education. Possessing, however, a great thirst for learning, he applied himself to his books in private, and became a very fine scholar in the English branches, especially excelling in arithmetic. In the common school, though yet a little boy, he had greater power of arithmetical analysis than some of his teachers. He completed algebra at the age of fifteen without an instructor. He chose teaching as his profession, which he followed for a number of years with gratifying success.

He took a mathematical course in the Ohio Wesleyan University in 1870, but did not finish it or graduate. In 1872, he was elected one of the teachers in the Greenville High School, which position he held till 1879. On the 24th of June, 1875, he married Miss Anna E. Kerlin, one of Dark county's most refined ladies. In 1879, he was elected to the chair of mathematics in the Missouri State Normal school, Kirksville, Missouri, which position he held till death called him from the confines of earth, ere his star of fame had reached the zenith of its glory. He was striken by that "demon of death," typhoid fever, and passed the mysterious shades, to be numbered with the silent majority, on the 8th of October, 1883. On March the 11th, 1880, he was elected a member of the London Mathematical Society, being the fifth American so honored.

Prof. Seitz was in mathematics what Demosthenes was in oratory; Shakespeare in poetry; and Napoleon in war: the equal of the best, the peer of all the rest.

He began his mathematical course in 1872 by contributing solutions to the problems proposed in the "Stairway" department of the *Schoolday Magazine*, conducted by Artemas Martin. His masterly and original solutions to difficult Average and Probability problems, soon attracted universal attention among mathematicians.

Dr. Martin, being desirous to know what works he had treating on that difficult subject, was greatly surprised to learn that he had no works upon the subject, but had learned what he knew about that difficult department of mathematical science by studying the problems and solutions in the *Schoolday Magazine*. He then contributed to the *Analyst*, the *Mathematical Visitor*, the *Mathematical Magazine*, the *School Visitor*, and the *Educational Times*, of London, England.

In each of these journals, Prof. Seitz was second to none, as his logical and
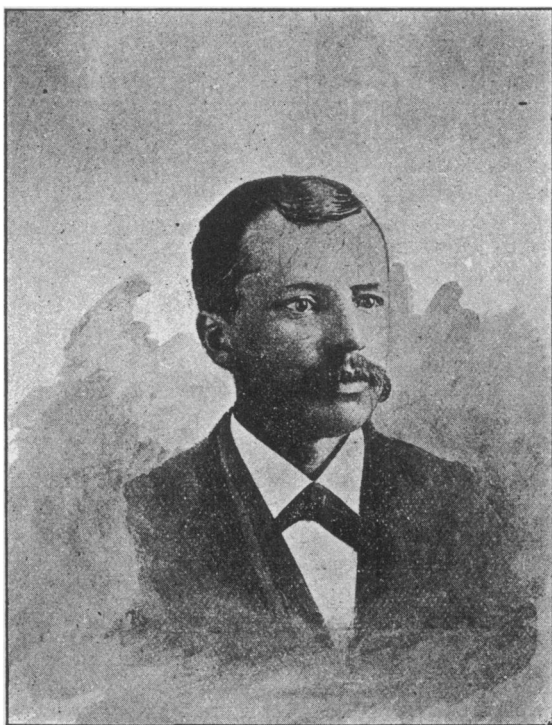
PROF. E. B. SEITZ.

classic solutions to Average and Probability problems, rising as so many monuments to his untiring patience and indomitable energy and perseverance will attest.

"His name first appears as a contributor to the *Educational Times* in Vol. XVII., of the *Reprint*, year 1873. To Vol. XXI., he contributed a solution of the problem, "Find the average area of a spherical triangle." His solution takes up just twelve lines, and it was the only solution received by the editor.

In Vol. XXXII., p. 105, he solved the problem, "If A, B, C, and D are four points taken at random in the surface of a given circle; show that the chance that E, the intersection of the straight lines through A, B and C, D, lies between A,B and between C,D, is $\dfrac{1}{3} - \dfrac{35}{36\pi^2}$ ".

In this communication his genius is displayed to a grand advantage; he is at home in his favorite field of investigation. The answer requires the evaluation of an octuple integral. The work is ably done and furnishes a fine specimen of what a classic solution ought to be. To Vol. XXXIX., he contributed a number of problems and solutions, and three solutions of problems proposed by other contributors; three have his own solution appended—no others, apparently, having been received by the editor. They look at first sight like a forest of definite integral symbols, but they are evidently in the line of his favorite pursuit, "Average and Probability." The *Mathematical Visitor* is adorned with some of his choicest solutions, which ever display his mathematical genius. His first solution for the *Mathematical Visitor* is of the following problem: "Find the equation to the locus of the centers of all the circles that can be incribed in a given semi-ellipse." The solution undoubtedly required a vast amount of patience and profound insight into the intricate and subtle relations which had to be traced in order to reach a result. The copying of the answer would exhaust the patience of the average student. On page 33, is a solution of the following problem: "A straight tree growing vertically on the side of a mountain was broken off by the wind, but not severed; find the chance that the top reaches the ground."

On page 37, is a solution to a prize problem. "A boy stepped upon a horizontal turn-table while it was in motion, and walked across it keeping all the time in the same vertical plane. The boy's velocity is supposed to be uniform in his track on the table, and the motion of the table toward him. The velocity of a point in the circumference of the turn-table is n times the velocity of the boy along the curve he describes. Required the nature of the curve the boy describes on the table, and the distance he walks while crossing it (1) when n is less than 1, (2) when n equals 1, (3) when n is greater than 1." His solution is a pantheon in grandeur and sublimity, adorned with the richest ornament of thought. Though the calculus acting as a radius vector, sweeping from one limit to another and embracing every element between the limits of that to which it is applied, yet through what a labyrinth of complex and hidden principles is the mind obliged to pass in order to see that the adjustment of this instrument will contain every element in its flight from one limit to another.

This solution alone would have been sufficient to place his name high in the category of American mathematicians. But this masterly solution is only one of the magnificent edifices of thought he erected for the children of men, in which they may congregate and learn something of the vastness and everlasting grandeur of its construction. On page 58 of the *Mathematical Visitor*, his name is attached to the solution of another "prize problem":

If $y = x + ax^2 + bx^3 + cx^4 + \&c.$ ......(1), and,

$x = y + Ay^2 + By^3 + Cy^4 + \&c.\dots\dots\dots(2)$;   find, A, B, C, D, E, F, G, H, I, J, K, L, M, N, P, in terms of a, b, c, d, e, f, g, h, i, j, k, l, m, n, p.

The principle involved in this problem is not the difficulty in effecting a solution; it is the prodigious amount of labor required in order to obtain a correct result. Any one acquainted with the process of reverting a series, knows that the work is tedious. But this wonderful mathematician, for whom no problem was too abstruse or labor too great, accomplished the work. His value of P covers about half of a quarto page. He finds the values of A, B, C, ... I, by actually performing the work, when the acuteness of his intellectual vision discerned a law by which the succeeding co-efficients could be easily written out.

On page 79, is a solution to the problem: "Find the average distance between two points taken at random within a rectangular solid, edge, a, b, c." The solution, with a beautiful figure, covers an entire page, and is grand and imposing.   On page 157, appears a fine solution to the problem: "If three dice be piled up at random on a horizontal plane, what is the probability that the pile will not fall down?"

On page 21, Vol. II, he has given a solution to the problem: "A cube is thrown into the air and a random shot is fired through it; find the chance that the shot passes through the opposite faces."

This problem had been proposed in 1864, by the great English mathematician, Prof. Woolhouse, who solved it with great labor. It was said by an eminent mathematician of that time, that the task of writing out a copy of that solution was worth more than the book in which it was published.

No other mathematician seemed to have the courage to investigate this problem after Prof. Woolhouse gave his solution to the world, till Prof. Seitz took it up and demonstrated it so elegantly in half a page of ordinary type, that he fairly astonished both the mathematicians of Europe and America.

Prof. Woolhouse was the best English authority on probabilities, even before Prof. Seitz was born.

It was the solution of this problem that won for Prof. Seitz the acknowledgment of his superior ability, in this abstruse department of mathematics, over any other man in either hemisphere. These are only a few of the many problems to which he has furnished the finest solutions. In studying his work, one is struck with the simplicity to which he has reduced the solutions of some of the most intricate problems. When he grasped a problem in its entirety, he had mastered all problems of that class. He would so vary the conditions in thinking of one special problem and in effecting a solution that he had generalized all similar cases, so exhaustive was his analyses. Behind the words he saw all the ideas represented. These he translated into symbols, and then he handled the symbols with a facility that has never been surpassed.

What he might have accomplished in his maturer years, no man may say; but at the age of thirty-seven he laid down his pen, and gave to God, from whence it came, the casement and the key of his mighty intellect, leaving his impress indelibly stamped upon the thinking and scientific world for all time. He has written his name in characters of gold and prismatic hues on the pinnacle of the temple of fame, and his good work will ever be cherished in the memories of those whom he has left behind.

He was a man of the most singularly blameless life; his disposition was amiable; his manner gentle and unobtrusive; and his decision, when circumstances demanded it, was prompt and firm as the rocks.

He did nothing from impulse; he carefully considered his course; and with a wise judgment came to conclusions that his conscience approved, and when his de-

cision was made, it was unalterable. He never made an open profession of religion, yet he was an intensely religious man. He rested his hopes on the sacrifice of the tender and loving Saviour, and we feel satisfied that he has entered into that rest which remaineth for the people of God.

Professor Seitz was not only a mathematician, but he was eminently proficient in other branches of knowledge. His mind was cast in a gigantic mold, "Being devout in heart as well as great in intellect, 'signs and quantities were to him but symbols of God's eternal truth' and he 'looked up through nature up to natures God.' Professor Seitz, in the very appropriate words of Dr. Peabody, regarding Benjamin Peirce, Professor of Mathematics and Astronomy in Harvard University, 'saw things precisely as they are seen by the infinite mind. He held the scales and compasses with which the eternal wisdom built the earth and meted out the heavens. As a mathematician, he was adored with awe. As a man, he was a christian in the whole aim and tenor of life.' " No mathematician was so universally loved and honored by his contemporaries as was Professor Seitz.

He did not gain his knowledge from books, for his library consisted of only a few books and periodicals. He gained such a profound insight into the subtle relation of numbers by close application with which he was particularly gifted. He was not a mathematical genius, that is, as usually understood, one who is born with mathematical powers fully developed; but he was a genius in that he was especially gifted with the power to concentrate his mind upon any subject he wished to investigate. This happy faculty of concentrating all his powers of mind upon one topic to the exclusion of all others and viewing that topic from all sides, enabled him to proceed with certainty. Thread by thread and step by step, he took up, and followed out, long lines of thought and arrived at correct conclusions. The darker and more subtle the question appeared to the average mind, the more eagerly he investigated it. No conditions were so complicated as to discourage him.

He left a wife and four sons, one of whom has gone to join his father in ths realms of eternal peace. His mother, now (1894) eighty-six years old is still living and enjoying good health.

LOWEST INTEGERS REPRESENTING SIDES OF A RIGHT TRIANGLE.

By LEONARD E. DICKSON, B. Sc., Fellow in Pure Mathematics, University of Texas.

Let the whole numbers expressing the lengths of the sides of a right-angled triangle be reduced to their lowest forms by dividing out their highest common divisor.

Call the resulting numbers a, b, and c.

1. They can not all be *even* numbers. For if so, they would still have the common divisor 2.

2. They can not all be *odd* numbers. For $a^2 + b^2 = c^2$; and, if a and b are odd, there squares are odd, and the sum of their squares even. But c^2 being even, c must be even.